

# THE LAND TORTOISE IN NEPAL : A REVIEW <sup>1</sup>

J. FRAZIER <sup>2</sup>

(With a plate and a text-figure)

Little is known of land tortoises (family Testudinidae) in the Indian subcontinent, and the information available from Nepal is remarkably muddled. Three very different species have been reported, but there are numerous unsupported statements and several claims of misidentification. Many authors have simply repeated (perhaps in a modified form) the statements of earlier publications without critically examining specimens or information. The present note reviews published and other information on land tortoises in Nepal, concluding that the only species definitely recorded in the country is *Indotestudo elongata*.

## INTRODUCTION

Three species of land tortoise (Testudinidae) have been claimed to occur in Nepal: *Geochelone elegans* (Schoepf), *Testudo horsfieldii* Gray and *Indotestudo elongata* (Blyth). The first named is found from north-eastern Rajasthan (western India) south to Sri Lanka (Iverson 1986 : 140; Frazier in prep.); hence, a Nepalese record would represent a major range extension.

*Testudo horsfieldii* is known to occur from the Caspian and Aral areas of West Central Asia (Shammakov 1981 : pl. 3; Yatyayev 1985 : pl. 4), eastward to Baluchistan and Afghanistan (Smith 1931 : 146, Hora 1948 : 296, Iverson 1986 : 172) and even to Xinjiang province of western China (Zhao 1973). Auffenberg (1974 : 195) suggested that *T. horsfieldii* occurs in the environs of Dehra Dun, Uttar Pradesh, India, west of the western border of Nepal, but no evidence has ever been presented to support this claim. It is, therefore, remarkable that the Nepalese 'record' (see below) is the easternmost for this species.

The third species recorded from Nepal, *Indotestudo elongata*, is known to occur from Indo-China westward to India (Smith 1931, Hoogmoed and Crumly 1984 : fig. 3, Iverson 1986 : 156), and as far west as Corbett National Park, Uttar Pradesh, India (Ross and Crumly 1983). This geographic range stretches across the east-west extent of the southern extreme of Nepal (Fig. 1).

Zoogeographically, *G. elegans* is typical of the central Indian and Deccan areas of the Indian subcontinent, *T. horsfieldii* is part of the Palearctic fauna, and *I. elongata* is characteristic of the Indo-Chinese subregion of the Oriental Region (Smith 1931 : 16, Hora 1948 : 296, Jayaram 1949 : 397, 1974 : 545-546). Species from all of these zoogeographic regions, subregions or areas are known to occur in the herpetofauna of Nepal (Swan and Leviton 1962, Waltner 1973a, b, c, d); hence, *a priori* any, or all, of the three above-named species of land tortoise could occur in Nepal.

The confusion stems mainly from the (mis)identification of a drawing donated by B.H. Hodgson to the British Museum (Natural History) (BM[NH]) in the mid-19th century. There is a long history of problems regarding drawings of herpetological specimens from this region (see Webb 1980), and the Hodgson tortoise drawing is remarkable in this respect.

## DISCUSSION

### *Geochelone elegans* (Schoepf)

There is only one record of this tortoise from Nepal. Laurie (1978 : 41) stated that "Reptiles and amphibians recorded in Chitawan include the marsh crocodile or mugger, the gharial, two species of monitor lizards, the starred tortoise and several species of lizards, snakes and frogs." The common name 'starred tortoise' is the most usual English name for *G. elegans* (e.g. Gunther 1864:4, Daniel 1983 : 30), and it is not regularly used for any other species in Asia.

<sup>1</sup> Accepted October 1990.

<sup>2</sup> Centro de Investigacion Y de Estudios Avanzados, Apartado Postal 73, 'Cordemex', Merida, Yucatan, Mexico, C.P. 97310.

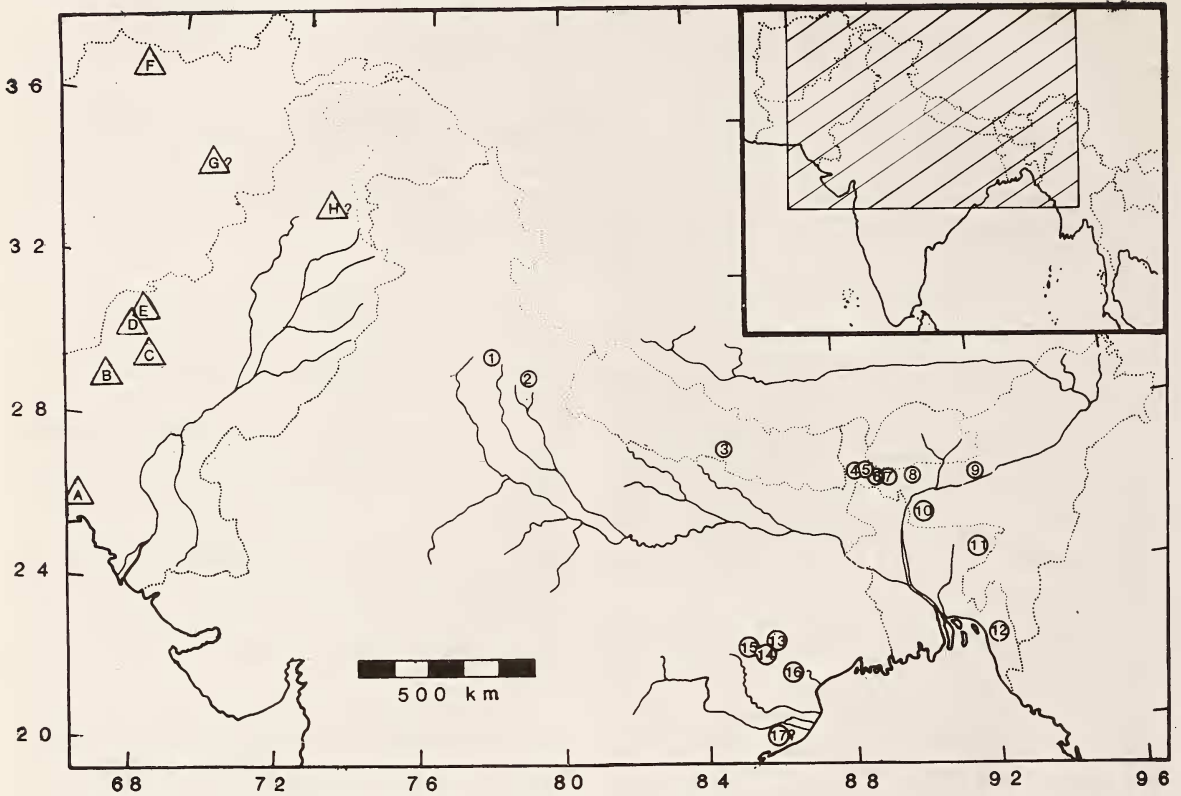


Fig. 1. The northern area of the Indian subcontinent, showing locality records for *Indotestudo elongata* (circles 1-17) at the western limit of its range, and also locality records of *Testudo horsfieldii* (triangles A-H) at the eastern limit of its range. See Appendices 1, 2 for details of each locality record. Dotted lines show political boundaries; only major river systems are indicated.

In the absence of any other supporting evidence, this record must be rejected as an error (indeed, the appendix of reptiles in Chitawan in Laurie's (1978) thesis lists *Testudo elongata*). No further mention of *G. elegans* will be made in the present discussion of Nepalese tortoises.

#### *Testudo horsfieldii* Gray

The first species of land tortoise reported from Nepal was *T. horsfieldii*. Gunther (1861 : 214) listed and described 41 species of reptiles and amphibians collected (either as actual

specimens or as drawings) by B.H. Hodgson. The first species in Gunther's list was *Testudo horsfieldii*, for which he simply stated "one coloured drawing," indicating that he had not examined a biological specimen. In fact, this 'specimen' (Plate 1), commissioned by Hodgson, is the root of nearly all misunderstanding regarding land tortoises in Nepal; it is, therefore, discussed in detail below.

It is noteworthy that three years later, Gunther (1864 : 8), evidently less confident about the identity of this drawing, wrote "A drawing made

from a Nepalese specimen, and presented by B.H. Hodgson to the British Museum, *appears* to represent this tortoise (*T. horsfieldii*); if the determination be correct, this species (*T. horsfieldii*) would extend to Nepal" (italics added). For some reason, Gunther was no longer simply stating that *T. horsfieldii* occurred in Nepal, but instead he qualified his listing of this species by suggesting that – on the basis of a drawing – it may extend into Nepal. He pointed out his unfamiliarity with *T. horsfieldii*, stating that he had seen only one specimen (1864 : 8); clearly, he was not certain of the identity of the species represented by the drawing.

Smith (1931 : 146), in his classic review of the chelonians of British India, made no mention of *T. horsfieldii* in Nepal, and he did not even cite Gunther's papers (1861, 1864) under the discussion of this species. However, he stated (p. 143) that Hodgson's drawing was of *Testudo elongata*, an earlier name for *Indotestudo elongata*. The fact that Smith (1931) included no mention of the previous (mis)identifications made by Gunther (1861: 218, 1864:8) left his re-identification as a source of confusion. One might surmise that in deference to the grand old guru of herpetology, Albert Gunther, Smith chose not to mention his elder's error.

Whatever his reasons, Smith's (1931) omission of any mention of a misidentification or his re-identification was seized upon as evidence that the identity of the land tortoise in Nepal was in a state of confusion. Swan and Leviton (1962 : 110) flatly rejected Gunther's identification by listing "*Testudo horsfieldi*, Gunther, 1861, p. 214 (Nepal); 1864, p. 7 (Nepal)" as a synonym for "*Testudo (= Indotestudo) elongata*". They went on to claim that "It is uncertain whether Smith considered Hodgson's drawing (which Gunther described as *T. horsfieldi*, *supra cit.*) to be *T. elongata* or whether Smith's reference is in error.

This treatment by Swan and Leviton (1962) is itself not without shortcomings. They failed to take into account that Gunther's second listing (1864: page 8' which deals with Nepal, not page 7 as they indicated) was a tentative identification,

clearly including simple and obvious reservations. Thus, to list '*T. horsfieldi* Gunther 1864 : 8' as a synonym of *I. elongata* is an oversimplification and misrepresentation of what Gunther had in fact written. In addition, Smith's (1931 : 143) meaning could not be clearer in his identification of the Hodgson drawing, and there is no reason to claim that he was confused. It is remarkable that, in spite of these identifications, re-identifications and criticisms of earlier authors, there is no evidence given by Swan and Leviton (1962) that they ever examined either a specimen of a land tortoise from Nepal or the root cause of all the confusion and discussion – the drawing presented by Hodgson to the BM (NH)! (Levitson, pers. comm. stated that they had not seen the drawing.)

In his summary of the reptiles of the Himalaya, Waltner (1973a, b) made no mention of *T. horsfieldii*. He did list *I. elongata*, evidently following Swan and Leviton (1962). Auffenberg (1974 : 195) suggested that *T. horsfieldii* occurs at Dehra Dun, to the west of Nepal, and "will eventually be found to inhabit much of the foothill area of the Himalayan mountains." However, he now believes (*in litt.* Dec. 1987) that the species involved is *Indotestudo elongata*, not *T. horsfieldii*.

Jayaram (1974 : 548) stated that "*Testudo horsfieldi* is widely distributed from the Caspian and Aral Seas to the north-western corner of India". There is absolutely no evidence that *T. horsfieldi* has ever been recorded in the territory known as 'India.' This error was apparently caused by Jayaram having lifted Smith's (1931 : 146) description of the range of this species, which specified "... to the north-western corner of British India." Omitting the word 'British' completely changes the area from the British India of the days of the Empire (which included Baluchistan, known to harbour *T. horsfieldi*) to modern India (which has never included Baluchistan).

The most recent mention of *T. horsfieldii* in Nepal is that of Majupuria (1981-82 : 152); he stated that "*Testudo horsfieldi* (sic) is represented in Hodgson's collection." No reference or sup-

porting evidence was given, but this claim was evidently based on Gunther (1861 : 218). Majupuria (1981-82 : 174) stated that *T. horsfieldii* was "Reported by Prater, 1928" in Nepal, but Prater's BOOK OF INDIAN ANIMALS, first published in 1928 and now in its fourth edition, although an invaluable source book on mammals of the Indian subcontinent, does not deal with tortoises or other reptiles. Hence, Majupuria's (1981-1982) statements about *T. horsfieldii* occurring in Nepal are without support.

#### *Indotestudo elongata* (Blyth)

The first mention of this species in Nepal is that of Smith (1931 : 143): "Hodgson obtained a specimen in the Saul forests of Nepal, and has left a fine coloured sketch of it in his collections of drawings." The mention of Saul forests implies that Smith had examined the drawing in question, for the words 'Land tortoise of Saul Forest' are pencilled on the bottom left, and this information has not appeared in previous—or subsequent—publications. In addition, the evaluation of the drawing as "fine" is further support for his having examined it because it is a realistic depiction (Fig. 2).

The next mention of *I. elongata* is that of Swan and Leviton (1962 : 110). As stated above, these authors rejected Gunther's (1861 : 218, 1864 : 8) accounts of *T. horsfieldii* and doubted the certainty of Smith's (1931 : 143) identification of *T. elongata*.

Yet, it was not explained how they arrived at their own identification, with no mention of having examined any relevant material. Nevertheless, they (1962 : 110) stated that *I. elongata* is found in central Nepal, presumed (p. 107 footnote 2) on the premise that Hodgson's material came mainly from the area around Kathmandu. More remarkable, they listed (Table 1, p. 138) this tortoise as known to occur in "Sikkim-Darjeeling"; no support for this claim was given, and none is known (see below). Swan and Leviton (1962 : 138) also predicted that *I. elongata* occurs in eastern Nepal, and they concluded that the species could be charac-

terised as having an Indo-Chinese distribution but extending into the eastern Himalaya.

Waltner (1973b : 29), in his review of Himalayan reptiles, listed *Testudo* (= *Indotestudo*) *elongata* as recorded from "Sikkim, Darjeeling, Teak forests of Nepal ...." and from 0 to 9,000 feet (0 to 2,740 m) in altitude. The distributional data appear to be based on Swan and Leviton (1962), but the occurrence of this tortoise in teak forests or at any altitude in Nepal is unsupported by any published information. Waltner (*in litt.* 20 Oct. 1987) stated that he had no firsthand experience with chelonians in this region. Furthermore, teak *Tectona grandis* does not naturally occur as far north as Nepal (Champion and Seth 1968, Stainton 1972).

It is important to point out that there is no evidence that *Indotestudo elongata* occurs in Sikkim and Darjeeling (c.f. Swan and Leviton 1962, Waltner 1973b : 29), an error which has evidently arisen from the inappropriate use by Swan and Leviton (1962 : Table 1) of 'Sikkim-Darjeeling' to refer to Sikkim and all of North Bengal (including Darjeeling, Jalpaiguri and Koch Bihar districts). There are several records of *I. elongata* from Jalpaiguri dist. (Smith 1931 : 96, Das 1988 : 21, 22), but none are known from Darjeeling or Koch Bihar districts or from Sikkim.

The name *Testudo elongata* appears in an appendix of the reptiles of Chitawan Park, Nepal, in Laurie's thesis (1978) on the rhinoceros *Rhinoceros unicornis*. However, this was apparently based on previous publications, not original data; and, as stated above, there is confusion in the text of the thesis as to which tortoise was being referred to.

Majupuria (1981-82 : 152, 174) stated that *Testudo* (= *Indotestudo*) *elongata* is recorded from Central Nepal, in Bagmati and Narayani zones. Although this is the first attempt to provide specific locality data for land tortoises in Nepal, it is not stated on what information these claims were based. A photograph published by Majupuria (1981-82) clearly shows three *I. elongata* together, but no indication of where these tortoises were collected is given; the caption

simply says "Land tortoises are distributed in Central Nepal."

Clearly, it has been common for authors to reiterate the Nepalese 'record' of Smith (1931 : 143). After it was repeated by Biswas *et al.* (1978), Ross and Crumley (1983) referred to it. However, as the last named authors pointed out, there is no exact locality for this 'record.'

Of the half dozen authors who have written about land tortoises in Nepal, none (with the possible exception of Majupuria) appears to have examined a specimen from that country; and only Gunther and Smith had obviously examined the drawing donated by Hodgson to the BM (NH).

#### Hodgson's drawing (Plate 1)

Smith (1931 : 5) gave a brief biographical account of Brian (or Bryan) Houghton Hodgson, and other details are presented by Archer (1962 : 11-12, 80) and Sawyer (1971 : 140). In short, Hodgson commissioned collections and drawings of local animals while based in Kathmandu from 1820 until 1844. A folio of 29 drawings bound into one volume is in the library of the BM (NH).

Only one Chelonian is depicted in this collection (Plate 9), and the coloured drawing of the land tortoise clearly illustrates several important features: nose and sides of the head are pink; head scales posterior to the frontal are relatively small in size; five claws are on each of the fore feet; the carapace is conspicuously more elongate than wide; there are conspicuous black, irregular blotches on each scute of the carapace; no spurs are evident in the area of the thighs (although they might not be seen from the angle shown); and a spur is conspicuous at the end of the tail. With the exception of black blotches on the carapace (which can occur in both species), all of these features are consistent with – if not diagnostic of – *Indotestudo elongata*, and inconsistent with *Testudo horsfieldii*.

At the bottom of the drawing, are several annotations. 'Land Tortoise of Saul Forest. nat. size.' is pencilled in at the far left ('Saul,' or more commonly 'Sal,' is the tree *Shorea robusta*). At the centre, in what appears to be different hand-

writing is '? Testudo indica.' That name, as well as the question mark, has a line through it, and 'Horsfieldii' is pencilled at the right of 'indica'; this appears to be in a third hand.

Directly under the pencilled species names are three lines of North Indian script: a pencilled line and below, in another hand, two inked lines. The pencilled line (with apparently four characters) is indecipherable. The literal translation of the two inked, Hindi-like, lines is 'R.V. Motiya Voli' and 'Kachhuwa.' R.V. Motiya Voli appears to be the name of a person. The last line, Kachhuwa, means turtle.

At the far right of the base of the drawing, in pencil, are two more lines of Hindi-like script; these appear to be in two additional hands. The upper line, of three characters, may be an abbreviated signature of R.V. Motiya Voli. However, it could also translate to 'Sugali' (or 'Sungali') the significance of which is unknown. In the bottom right corner is 'A.V. Lapcha' (or 'Zapcha'); this is evidently a person's name – probably a Nepali (although Archer (1962 : 11) stated that Hodgson hired Indian assistants). Which, if any, of these names apply to the artist or collector is unknown.

In summary, it appears as if at least five different people have annotated this drawing: three in English and between two (in the case that one person signed in full and then with initials) and four in Hindi, or another north Indian script. Some of the annotations are clearly attempts to identify the drawing, others may indicate who was involved in its execution. The comments relevant to habitat and size are likely to have been written soon after the drawing was given to Hodgson, and the north Indian script was almost certainly added while the drawing was in 'British India'.

On the back side of the drawing, in pencil, is the list of measurements (apparently in inches and fractions of inches, except for one value in pounds), as shown in Table 1.

Records in the India Office Library (Archer 1962 : 12) and the BM (NH) library, archives and publications show that a number of well known herpetologists had corresponded with B.H. Hodgson and examined material donated by him,

TABLE 1  
MEASUREMENTS INDICATED ON HOGSDON'S DRAWING

Length of shell	0.11.0
Width	7 1/2
Height	- 5 -
Length of head	- 2 3/4
Width of head	- 1 5/8
Length of leg, fore, as fully exserted (sic)	4 1/4
Length of leg, hind, as fully exserted (sic)	4 1/2
Weight	6 lbs
Tail to vent	1 5/8
Tail to dorsal shell	2 1/4

including T.E. Cantor, J.E. Gray, A.C.L.G. Gunther, Dr Hooker, Dr T. Horsfield, and M.A. Smith. However, neither Andrew Stimson (of the Herpetology Section) nor the Librarian of the BM (NH) could identify any of the handwriting on the tortoise drawing; it did not match handwriting samples of either Gunther or Smith.

Archer (1962 : 80) stated that light pencilled inscriptions on some of Hodgson's drawings deposited in India House (India Office Library) were in Nagari. On the basis of this she suggested that the draughtsmen were Hindus from Bihar or United Provinces (now Uttar Pradesh).

It is probably of little significance that the Hodgson drawing was originally named ' ? *Testudo indica*, ' for very little was known of chelonians in the Indian region during the last century, and there was tremendous nomenclatural confusion. That Boulenger (1889 : 172) regarded *T. indica* as an extinct species from Mauritius, and considered the name as a synonym for one of the Galapagos tortoises ('*Testudo nigrata*' = *Geochelone elephantopus*) (Boulenger 1889 : 169) shows how confused the species names were (see also Theobald 1870 : 674 for a criticism of the use of the species *indica* for Indian species of tortoises). There is no reason to further confuse the question of which tortoise is in Nepal by considering these island species.

Of more importance is: who re-identified the drawing as *T. horsfieldii* ? However, it may never be possible to determine who annotated this drawing.

Assuming that the values on the back of the

drawing are reliable measurements of the specimen depicted on the front, its identity is even more clear. When compared with measurements of specimens of the two species in question (Frazier, unpublished data), the dimensions of the shell — 11" (28 cm) long; 7.5" (19 cm) wide; and 5" (13 cm) high — are consistent with *Indotestudo elongata* and inconsistent with *Testudo horsfieldii*.

**Recent specimens and records from the terai:** In 1974 C.A. Ross (Ross and Crumly 1983) found a specimen of *Geochelone* (= *Indotestudo*) *elongata* "in the vicinity of Gairal Forest Rest House, Corbett National Park, about 25-30 km north-west of Ramnagar." This locality (Fig. 1) is about 75 km west of the Nepalese border, in Garhwal district, Uttar Pradesh.

On 16 April 1985, Dr J.C. Mitchell found the remains of a shell of *Indotestudo elongata* (USNM 267020) at Sauraha, Chitwan, Narayani district, Nepal (Fig. 1). Although incomplete and dog-chewed, this appears to be the only Nepalese specimen of this species deposited in a museum (although it could not be found in September 1988).

*Indotestudo elongata* apparently also occurs in the vicinity of Dehra Dun, Uttar Pradesh, India, to the west of Nepal (Fig. 1). Dr R.K. Bhatnagar, formerly in charge of the Herpetology Section of the Zoological Survey of India (ZSI) station in Dehra Dun, wrote (*in litt.* 4 December 1987) that "before 1970" he collected a gravid female tortoise (unidentified) from Phandowala, Dehra Dun Siwaliks, now Rajaji National Park; the specimen was left at the ZSI station. Dr W. Auffenberg reported (*in litt.* December 1987) that he has "seen a slide of a specimen photographed near Dehra Dun and it is *elongata*". Apparently, the slide came from Dr. R.K. Bhatnagar.

Dr R. Tilak, Officer-in-charge of the ZSI station, Dehra Dun, reported (*in litt.* 5 February 1988) that they had no trace of any specimen of *T. horsfieldii*, but did have a mounted specimen of *I. elongata*. Measurements and photographs of this specimen, provided by B.C. Choudhry (*in litt.* 13 March 1989), show that it is an adult female *I.*

*elongata* (curved carapace measurements: length 27.3, width 22.7 cm.; 17 to 18 growth rings), with very little black on the carapace.

These recent records show that *Indotestudo elongata* occurs along the Terai, or Himalayan foothills, as far west as Dehra Dun. This further supports the occurrence of this species in Nepal.

#### CONCLUSIONS

There is no evidence to support the contention that *Testudo horsfieldii* occurs in Nepal. The occurrence of *Indotestudo elongata*, although confused by more than a century of misidentification, is traceable back to the first evidence of a species of Testudinidae in that country – viz. Hodgson's drawing.

It must be appreciated that when Gunther (1864 : 8) wrote about Hodgson's drawing, he had only seen one specimen of *T. horsfieldii*. Furthermore, *I. elongata* was described in 1853 from Burma (Blyth 1853), and the first recorded accessions in the BM (NH) of this species, all from Indo-China, were in 1861 and 1862, and at the time of Boulenger's Catalogue (1889: 174) there was still not a single specimen in the BM (NH) from a locality near to Nepal. In short, when Gunther was writing, both species were represented by very few specimens, in the BM (NH) at least, and the known range of *T. horsfieldii* was much closer to Hodgson's 'locality' than was the known range of *I. elongata*.

The resolution of which species of tortoise occurs in Nepal is of central importance to zoogeographic arguments. Well known for harbouring not only endemics, but various faunal elements from diverse zoogeographic regions and subregions (e.g. Swan and Leviton 1962), Nepal provides unique insights into the biogeographical history of these animals. One interpretation is that the Indo-Chinese tortoise has been able to expand its range westward across the Brahmaputra, along the Himalayan foothills and past the Ganges. This is consistent with the Satpura Hypothesis of Hora (1948).

However, together with the extensive north Indian/Nepalese distribution of *I. elongata*, one

must consider the closely related Travancore tortoise *Indotestudo forstenii* (Schlegel and Muller), isolated some 2,000 km to the south in the Western Ghats. This situation is strong support for Smith's statement (1931 : 16): "The Indo-Chinese hill tortoises, *Testudo elongata* and *Geoemyda tricarinata*, did not extend their range into the peninsula of India (Chhota Nagpur) by crossing the Gangetic Plain" (and on p. 143: "That it [*I. elongata*] ever crossed the Gangetic Plain as we know it today is, of course, highly improbable"). Instead, these represent relict distributions of an ancestor that was widely distributed during a period when environmental conditions were very different from what they are now.

It is important to point out that Ross and Crumly (1983 : 429) misrepresented Smith (1931 : 16, 143) in stating that "Smith also contended that it was unlikely that *G. elongata* ever extended across the Gangetic Plain." Smith clearly was concerned that there are species whose present range extends across the Gangetic Plain, and he seemed to favour the argument that this geographic distribution predated the Gangetic Plain.

Elements of both Smith's (1931) and Hora's (1948) explanations are compatible; the two hypotheses would need to be mutually exclusive only if the time period under consideration were the same. If *I. elongata* truly is of Indo-Chinese origin, then at some point it, or its ancestor, had to expand its range westward some thousands of kilometres, across what is today Nepal and as far as Dehra Dun. This could then have been followed by a change in environmental conditions (perhaps even the birth of major rivers such as the Ganga and Brahmaputra) and subsequent isolation of the population into southern and northern hill sites.

The Nepalese and Uttar Pradesh records show that despite changes which might have taken place in the environment and distribution of *I. elongata*, it has managed to survive across the length of the Gangetic plain, nearly to the south-eastern limit of the Palearctic region. Its occurrence in both the terai and Chhota Nagpur show that it is on both sides of the Ganga, and the

species is unquestionably on both sides of the Brahmaputra.

Ironically, a complementary question which surfaces in the light of this evidence is: why has *T. horsfieldii* not be able to expand into the western Himalayan area? The eastern limit of its geographic range (Fig. 1) extends to central Afghanistan and Baluchistan (although there are questionable records from the major cities of Kabul and Islamabad). The answer appears to be in the major mountain ranges of eastern Afghanistan, northern Pakistan and Kashmir. Although the species is said to live at altitudes between 1,000 and 2,000 m (J. Anderson, pers. comm.), there is no evidence that this palearctic species has ever been able to survive – much less cross – these

high ranges (over 3,000 m) with rigorous climate and impoverished soil and vegetation.

#### ACKNOWLEDGEMENTS

Valuable information and comments were given by K. Adler, K. Asher, W. Auffenberg, R. K. Bhatnagar, B.C. Choudhry, I. Das, J.B. Iverson, J.C. Mitchell, A.E. Leviton, W.A. Rodgers, A.F. Stimson, R. Tilak, R.C. Waltner, R.G. Webb, and C. Wemmer. The library of the British Museum (Natural History) kindly allowed me to examine the Hodgson drawings and to photograph and reproduce plate 9 from that collection here. Information was compiled while supported by the Indo-American Fellowship Program and the U.S. Fish and Wildlife Service.

#### REFERENCES

- ANDERSON, J. (1878-9): Anatomical and zoological researches and zoological results of the Yunnan Expeditions. Reptilia and Amphibia. Calcutta. pp. 705-860.
- ANNANDALE, N. (1913): The tortoises of Chota Nagpur. *Rec. Ind. Mus.* 9 (2) : 63-78, pls. v & vi.
- ARCHER, M. (1962): Natural history drawings in the India Office Library. Her Majesty's Stationery Office, London.
- AUFFENBERG, W. (1974): Checklist of fossil land tortoises (Testudinidae). *Bull. Florida State Mus.* 18(3): 121-251.
- BAYLIS, H.S. & DAUBNEY, R. (1922): Report on the parasitic nematodes in the collection of the Zoological Survey of India. *Mem. Ind. Mus.* 7(4): 263-347.
- BISWAS, S., ACHARJYO, L.N. & MOHAPATRA, S. (1978): Notes on the distribution, sexual dimorphism and growth in captivity of *Geochelone elongata* (Blyth). *J. Bombay nat. Hist. Soc.* 75: 928-930.
- BOULENGER, G.A. (1889): Catalogue of the Chelonians, Rhynchocephalians, and crocodiles in the British Museum (Natural History). British Museum, London. Reprinted 1966, Wheldon & Wesley and Verlag Cramer; Leher, Germany.
- BLYTH, E. (1853): Notices and descriptions of various reptiles, new or little known. *J. Asiatic Soc. Bengal* 22 (5): 639-655.
- CHAMPION, H.G. & SETH, S.K. (1968): A revised survey of the forest types of India. Govt. of India Press, New Delhi.
- DANIEL, J.C. (1983): The book of Indian reptiles. Bombay Natural History Society, Bombay.
- DAS, I. (1988): A survey of land tortoises and freshwater turtles of north-eastern India: Final report. IUCN/WWF Project 6343.
- GHALIB, S.A., RAHMAN, H., IFFAT, F. & HASNAIN, S.A. (1976): A checklist of the reptiles of Pakistan. *Rec. Zool. Surv. Pak.* 8 (1 & 2): 37-59.
- GUNTHER, A. [C.L.G.] (1861): List of cold-blooded vertebrata collected by B.H. Hodgson, Esq., in Nepal. *Proc. Zool. Soc., Lond.* 1861: 213-227.
- GUNTHER, A.C.L.G. (1864): The Reptiles of British India. Ray Society, London. Reprinted 1987 ? Oxford and IBH Publishing Co., New Delhi.
- HODGSON, B.H. (n.d.): Drawings of reptiles, fishes, etc., presented by B.H. Hodgson. Original in the library of the British Museum (Natural History).
- HOOGMOED, M.S. & CRUMLY, C.R. (1984): Land tortoise types in the Rijksmuseum van Natuurlijke Historie with comments on nomenclature and systematics (Reptilia : Testudines: Testudinidae). *Zool. Meded.* 58 (15): 241-259.
- HORA, S.L. (1948): The distribution of crocodiles and chelonians in Ceylon, India, Burma and farther east. *Proc. Nat. Inst. Sci. India.* 14 (6): 285-310.
- IVERSON, J.B. (1986): A checklist with distribution maps of the turtles of the world. Privately printed; Richmond, Indiana.
- JAYARAM, K.C. (1949): A note on the distribution of chelonians of peninsular India with Malayan affinities. *Proc. Nat. Inst. Sci.* 15 (8): 397-398.
- JAYARAM, K.C. (1974): Ecology and distribution of freshwater fishes, amphibians and reptiles. In: Mani, M.S. (ed.). Ecology and biogeography in India. Junk, The Hague. pp. 517-584.
- LAURIE, W.A. (1978): The ecology and behaviour of the greater one horned rhinoceros. Unpublished D. Phil. thesis, Cambridge University.
- MAJUPURIA, T.C. (1981-82): Wild is Beautiful: Introduction to the magnificent, rich and varied fauna and wildlife of Nepal. S. Devi, Lashrar (Gwalior).





Plate 9 of the BM (NH) collection of B.H. Hodgson's drawings. Photo courtesy British Museum (Natural History).

